Advantages of treating posts

Posts of low natural durability can be made more durable by impregnating the sapwood with preservative to form a protective outer layer around the relatively impermeable heartwood. Protection of the sapwood also makes a post stronger, as sapwood contributes over half its strength.

Most eucalypt species are suitable for preservative treatment, provided the sapwood band is at least 12 mm thick, and is not split or damaged by borers. Pine species, in which the juvenile wood absorbs preservative, are also suitable for treatment.

Selection of posts

Choose trees that will provide the smallest posts, strong enough for their proposed use. Small posts require less preservative per post; more can be treated in a batch and they are cheaper to handle and transport.

Posts should be straight and free of branch stubs so that they can be closely packed in the treatment vessels.

Most round fence posts are 1.8 m long and 75 mm to 125 mm diameter under bark at the small end. Different sizes are needed for other uses such as vine trellises. Cut the posts longer than needed to allow for docking of split ends after drying.

Debarking

All bark must be removed before treatment because even small patches prevent uniform uptake of the preservative. This should be done immediately after felling to discourage borers. Bark is most easily removed from trees cut down when the annual flush of growth begins in spring/summer.

Debarking can be done with an axe, or for some species a shovel is better. Mobile debarkers are available commercially and can be powered with a tractor power take-off, or smaller hand-held models can be attached to the drive wheel of a chainsaw.

Drying

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Efficient stacking arrangement for drying debarked posts

Wood preservatives penetrate dry posts better than green ones. Posts should be dried to a sapwood moisture content of less than 30 per cent**.** Drying time varies with drying conditions, but may take eight to 10 weeks under summer conditions in the south-west of Western Australia. Drying in winter may reduce splitting but drying times are slower.

Sapwood moisture content can he measured with a hand-held electrical resistance moisture meter or calculated by the oven-dry method. The oven-dry method involves extracting a piece of sapwood (50 x 50 x 25 mm), weighing, then oven-drying this piece to constant weight and calculating the moisture content from the weight lost during oven-drying.

To dry posts, place them in a well ventilated stack in a position that makes use of prevailing winds. Very high summer temperatures may cause too-rapid drying and excessive splitting of the ends. In hot

conditions stack the posts in a sheltered location such as a shed, or within the plantation. Covering the posts with tree tops and branches gives added protection.

Chemicals

The oil-borne preservative *high temperature creosote,* (HTC) is recommended for treating posts on the farm. A 205 L drum of HTC (ex Perth) costs about $240 if a pallet of four drums is bought. Costs can be reduced by including mineral oil or distillate, for example a 60:40 mixture of creosote and furnace oil. Some commercial creosote treaters are: Norman Bario, Mt Barker; Dryandra Timber Products, Cuballing; and C.C. and J. Russell, Narrogin.

The water-borne chemical *copper-chrome-arsenic* (CCA) can be used to treat posts, but is only available to registered commercial treatment plants. Farmers in the south-west can have posts treated with CCA at Timber Treaters WA at Bridgetown, Koppers Timber Preservation at Picton or Bunnings Forest Products at Mundijong. Posts from Esperance area can be treated at Esperance Treated Timbers at Gibson.

Treatment

Measuring post and sapwood volume to estimate uptake of preservative

Insulated drum (left) for hot and cold bath method; cold soak method on right. Note sapwood bands on posts (foreground)

Before treating the dried posts, drill any holes and dock at least 50 mm from their ends to remove dirt and large cracks. Clean off any other dirt or materials that may interfere with the uptake of preservative. Sort the posts into diameter classes, then measure the small and large end diameters and sapwood depths, and calculate the sapwood and post volumes.

The minimum creosote retention required for posts in contact with the ground is 92 litres per cubic metre of sapwood (10 per cent mass/mass) for the butt end and 51 litres per cubic metre for the crown end, which does not contact the ground. The amount of creosote to be used is calculated from these minimum retentions and the sapwood volume.

Uptake of HTC can be estimated from the drop in the level of preservative in the treatment vessel or if suitable scales are available, by weighing posts before and after treatment. With experience, the uptake of HTC for the crown and butt sections can be estimated from previous batches. For example, the average sapwood volume for a batch of marri posts with a mean diameter at the small end of 100 mm treated in a 205 litre drum, is about 0.2 cubic metres. The estimated uptake (per batch as above) for the butts is 10 litres and the crowns, 8 litres. (The 8 litres may seem high for crowns but this is because although the required uptake is less, crowns constitute two-thirds of the post length; butts one-third.)

Treatment methods

The two methods recommended for farm use are cold soaking and the hot and cold bath process. Usually, butts are treated by the hot and cold bath process as this gives better penetration, and crowns by cold soaking alone.

Cold soaking

Dry fence posts are simply soaked in cold HTC until the required amount has been absorbed. This is done in two stages - a long treatment for the butts and a shorter treatment for the crowns.

Cold soaking can take about 14 days to treat the butts of dry regrowth marri posts (with a mean small end diameter of 100 mm). Low density species like Tasmanian blue gum or radiata pine take about half as long to treat.

Hot and cold bath process

The hot and cold bath process is much quicker than cold soaking. It takes only five to six hours, enabling several batches to be treated in a day. Dry posts are heated in hot HTC, steam or hot water to drive out any air in the posts, then cooled in HTC. Preservative is absorbed by the cooling posts to replace the air driven out. Heating to just below 100°C in water, or to higher temperatures in HTC, oil or steam, is most effective.

Cooling of posts can occur in the hot HTC when heating is removed. However, it is more efficient to maintain the heated bath and quickly transfer heated batches to a separate bath of cold preservative. This frees up the hot bath for a fresh batch of posts without wasting its heat. The hot treatment should take one to two hours and the cold treatment about four hours. A typical system could involve one hot drum and two or three cold treatment drums.

Note: Creosote is flammable, so it should not be heated with an open flame. An electric base hotplate is recommended.

For both processes, (cold soaking or hot and cold bath), when the required amount of HTC has been absorbed the posts are removed from the treatment drum and placed in drainage troughs to collect excess creosote draining from the posts. The excess is measured and returned to the treatment drum.

One test post from each batch should be assessed for creosote penetration. Do this by cross cutting the butt section at 300 mm, 600 mm and 760 mm from the treated end. Split the cut sections to examine the penetration. If the sapwood is not completely impregnated, especially around the ground-line position, longer treatment is needed.

Equipment

Basic equipment required for treating 1.8 m posts with HTC is:

- A 205 L drum for butt treatment (760 mm) and an extended drum (1300 mm) to treat the crowns.
- Draining troughs made by cutting a 205 L drum lengthwise, with leaning rails to support the posts standing in them.
- Electric base hotplate with thermostat, and thermometer to monitor temperature.
- Insulation to wrap around the hot drum, to improve heating efficiency.
- Metal grid to fit the base of the drum, to raise the posts off the bottom and allow the creosote to readily penetrate the ends.

- Dipstick to measure changes in preservative levels.

Safety

- Avoid using the product (HTC) in strong sunlight and hot conditions.
- Wear full length clothing, gloves, goggles, shoes and hat while using the product.
- Apply a UV barrier cream to exposed skin: face, neck and wrists before using the product.
- Wash hands and face with soap and warm water after using the product.
- Creosote is flammable. Do not expose it to an open flame.
- Consult the product's Material Safety Data Sheet.

Species suitable for treatment on the farm

The sapwood of the following species can be readily treated with timber preservatives such as HTC and CCA. The heartwood of virtually all species is resistant to impregnation.

- Tasmanian blue gum *(Eucalyptus globulus* subsp. *globulus)*
- Rose gum (*E. grandis*)
- Spotted gum (*Corymbia maculata)*
- Marri (*C. calophylla*)
- Jarrah *(E. marginata)*
- Sugar gum *(E. cladocalyx)*
- Yellow stringybark *(E. muelleriana)*
- River red gum *(E. camuldulensis)*
- Maritime pine *(Pinus pinaster)*
- Radiata pine *(P. radiata).*

Commercial treatment costs

Koppers Australia of Picton (at March 1998) charge $160/m^3 ($95/m^3 for treatment and $65/m^3 for debarking and preparation) to treat pine fence posts with copper-chrome-arsenic (CCA) to a retention of 7 kg/m^3 (oxide) which is to Hazard Level 4, using a vacuum/pressure impregnation process. Similar prices are charged by two other South West treatment plants: Timber Treaters at Bridgetown and Bunnings Forest Products, Mundijong. If using a commercial treatment plant, the land owner would have the additional cost of harvesting and transport to and from the plant.

For HTC treatment on the farm (preservative only) your costs will be about $1.20 per post (about $80/m^3) compared with about $3.00 per post treated commercially ($200 to $230/m^3).

Conclusion

Do-it-yourself treatment of posts is straight-forward, although reasonable care and safety procedures are required to ensure best results. Unless many posts are needed in a short time, treatment can often be scheduled between other jobs. Handling equipment is not essential but is very useful for handling large posts and strainers.

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Further information

If further information required, please contact Gary Brennan at the CALM Timber Technology Centre, Harvey, on (08) 9729 1913.

DISCLAIMER

This *TreeNote* discusses the use of chemicals in treating posts. These chemicals can be dangerous if not handled properly. This *TreeNote* does not provide advice about the safe handling of chemicals. You should ask the chemical manufacturer or supplier for instructions in the safe handling of these chemicals. Agriculture Western Australia and the Department of Conservation and Land Management do not accept responsibility for any injury, damage or loss caused by the use of chemicals mentioned in this *TreeNote*.

Companies named as treatment plants are given as examples; this does not imply endorsement or preference for the companies mentioned and any omission of a company name is unintentional. Specifications and prices quoted are subject to change.

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Wood ways

Wood in contact with the ground, or wood used above ground that often gets wet, is attacked by decaying fungi and insects. Wood fence posts, garden furniture, wooden gates, garden sheds and so on will all be subjected to attack, but there are ways to preserve timber that is exposed to the elements:

Fence posts

Creosote is one of the most common treatments, but others include tributyltin oxide-lindane (TBTOL) and boron, both of which do not alter the natural colour of the wood. You may darken the colour slightly by applying pentachlorophenol (PCP) or pentachlorophenol-zinc¬naphthenate (PCPZN). You should apply a water repellent in all cases if the wood is going to be exposed to rainfall.

Copper-chromium-arsenic (CCA) treatment gives the wood a light green hue, but no water repellent ingredient is required in the solution in this case. In the case of fence posts, you can enhance the wood's durability by capping the top of the post with a wood or metal cap which will not allow rainwater to penetrate the top of the post. Alternatively, cut the top of the post to a point (four-sided pyramid shape) or cut it at an angle so that rainwater flows straight off and cannot pool.

Garden furniture

Generally, garden furniture, sun decks and the like are varnished or painted — a host of enamel paints, varnishes and wood preservation products being available at your local hardware dealer. However, the points on garden furniture that make contact with the ground or paving are the first to lose their protective coating.

Help them fight back: every so often stand the legs in tin cans filled with preservative — be it diluted varnish or whatever treatment you have used; over a couple of hours, the solution will seep up the legs, enhancing protection. Lastly, where the resting surface is a length of timber, tack small scrap spacers to the underside to keep the main surface clear of the grass or paving and so able to dry far quicker after a downpour.